Initial Assessment of NOAA Fisheries' Critical Habitat Analytical Review Teams For 13 Evolutionarily Significant Units of Pacific Salmon and O. mykiss

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ACRONYMS

ESA	Endangered Species Act
ESU	evolutionarily significant unit
CHART	Critical Habitat Analytical Review Team
mi2	square mile
NOAA Fisheries	National Marine Fisheries Service
ODFW	Oregon Department of Fish and Wildlife
LCR	Lower Columbia River
NWR	NOAA Fisheries Northwest Region
ANPR	Advanced Notice of Proposed Rulemaking
USGS	U.S. Geological Survey
HUC	hydrologic unit code
IDFG	Idaho Department of Fish and Game
ICBTRT	Interior Coumbia Basin Technical Recovery Team
NRC	National Research Council
ODFW	Oregon Department of Fish and Wildlife
GIS	geographic information systems
PCE	primary constituent element
HCD	Habitat Conservation Division
TRT	Technical Recovery Team
WDFW	Washington Department of Fish and Wildlife

EXECUTIVE SUMMARY

This report contains biological assessments supporting NOAA Fisheries, Northwest Region's (NWR) proposed designation of critical habitat under section 4 of the Endangered Species Act for 12 listed salmon and steelhead evolutionarily significant units (ESU) and one ESU proposed for listing.[1] The NOAA Fisheries NWR grouped the ESUs under its jurisdiction in Washington, Oregon, and Idaho into five geographic domains for the purpose of assessing critical habitat. For each domain the agency convened a critical habitat analytical review team (CHART) charged with analyzing the best available data for each ESU to make findings regarding the presence of essential habitat features in each watershed, potential management actions that may affect those features, and the conservation value of each watershed within each ESU's range. This report summarizes the agency's mapping efforts, methods and information used, and initial CHART assessments for these 13 ESUs. This information will be used in conjunction with other agency analyses (e.g., economic analyses) to support NOAA Fisheries' proposed critical habitat designations.

[1] The 12 salmon and steelhead species include the following evolutionarily significant units (ESU) of Pacific salmon and steelhead: Puget Sound chinook salmon; Lower Columbia River chinook salmon; Upper Willamette River chinook salmon; Upper Columbia River spring-run chinook salmon; Hood Canal summer-run chum salmon; Columbia River chum salmon; Ozette Lake sockeye salmon; Upper Columbia River steelhead; Snake River Basin steelhead; Lower Columbia River steelhead; Upper Willamette River steelhead; and Middle Columbia River steelhead. The ESU proposed for listing is Oregon Coast coho salmon (69 Fed. Reg. 33102, June 14, 2004).

BACKGROUND

Over the past several years, NOAA Fisheries has listed 26 distinct population segments, or evolutionarily significant units (ESU), of Pacific salmon and steelhead in Oregon, Washington, Idaho and California. Collectively, these ESUs occupy thousands of miles of streams in watersheds covering more than 250 thousand square miles. In 2000, NOAA Fisheries designated critical habitat for 19 of the listed ESUs (65 FR 7764, February 16, 2000). These designations were challenged in court on a number of grounds. NOAA Fisheries entered into a consent decree resolving these claims and pursuant to court order the designations were vacated. Following remand, NOAA Fisheries received 60-day notice of intent to sue letters from environmental groups, for not having designations in place for these 19 ESUs and one additional ESU, Northern California steelhead. The agency entered into a consent decree with the environmental groups establishing a schedule for completing new designations.

This report contains biological assessments supporting proposed critical habitat designations for the following 13 listed salmon and steelhead[2] ESUs under the jurisdiction of the NOAA Fisheries Northwest Region (NWR): (1) Puget Sound chinook salmon; (2) Lower Columbia River chinook salmon; (3) Upper Willamette River chinook salmon; (4) Upper Columbia River spring-run chinook salmon; (5) Oregon Coast coho salmon; (6) Hood Canal summer-run chum salmon; (7) Columbia River chum salmon; (8) Ozette Lake sockeye salmon; (9) Upper Columbia River O. mykiss; (10) Snake River Basin O. mykiss; (11) Middle Columbia River O. mykiss; (12) Lower Columbia River O. mykiss; and (13) Upper Willamette River O. mykiss.

[2] In its ESA listing of determinations for Pacific salmon and steelhead (O. mykiss), we have treated an ESU as a distinct population segment and to date has identified six species comprised of 52 ESUs in Washington, Oregon, Idaho and California. We have determined that resident rainbow trout and anadromous steelhead are part of the same ESU in certain areas (for further discussion see 69 FR 33101, June 14, 2004). The U.S. Fish and Wildlife Service (FWS) maintains jurisdiction over the rainbow trout components of these O. mykiss ESUs. In this report, "O. mykiss" ESUs refer to ESUs including populations of both anadromous steelhead and resident rainbow trout. Also, reference to "salmon" in this document implies all members of the genus Oncorhynchus, including O. mykiss.

CRITICAL HABITAT UNDER THE ESA

The ESA defines critical habitat under section 3(5)(A) as follows:

> (i) the specific areas within the geographical area occupied by the species, at the time it is listed . . ., on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and
>
> (ii) specific areas outside the geographical area occupied by the species at the time it is listed . . . upon a determination by the Secretary that such areas are essential for the conservation of the species.

Once critical habitat is designated, ESA Section 7 requires federal agencies to ensure that they do not fund, authorize, or carry out any actions that will destroy or adversely modify that habitat. This requirement is in addition to the Section 7 requirement that federal agencies ensure that their actions do not jeopardize the continued existence of listed species.

A recent amendment to section 4(a) of the Act excludes military land from designation, where that land is covered by an Integrated Natural Resource Management Plan that the Secretary has found in writing will benefit the listed species.

ESA Section 4(b)(2) requires NMFS to designate critical habitat for threatened and endangered species "on the basis of the best scientific data available and after taking into consideration the economic impact, impact on national security, and any other relevant impact, of specifying any particular area as critical habitat." This section grants the Secretary [of Commerce] discretion to exclude any area from critical habitat if he determines "the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat." The Secretary's discretion is limited, as he may not exclude areas if it "will result in the extinction of the species."

Salmonid Life History

Pacific salmon and steelhead are anadromous fish, meaning adults migrate from the ocean to spawn in freshwater lakes and streams where their offspring hatch and rear prior to migrating back to the ocean to forage until maturity. The migration and spawning times vary considerably between and within species and populations (Groot and Margolis, 1991). At spawning, adults pair up to lay and fertilize thousands of eggs in freshwater gravel nests or "redds" excavated by females. Depending on lake/stream temperatures, eggs incubate for several weeks to months before hatching as "alevins" (a larval life stage dependent on food stored in a yolk sac). Following yolk sac absorption, alevins emerge from the gravel as young juveniles called “fry” and begin actively feeding. Depending on the species and location, juveniles may spend from a few hours to several years in freshwater areas before migrating to the ocean. The physiological and behavioral changes required for the transition to salt water result in a distinct “smolt” stage in most species. On their journey, juveniles must migrate downstream through every riverine and estuarine corridor between their natal lake or stream and the ocean. For example, smolts from Idaho will travel as far as 900 miles from their inland spawning grounds. En route to the ocean, the juveniles may spend from a few days to several weeks in the estuary, depending on the species. The highly productive estuarine environment is an important feeding and acclimation area for juveniles preparing to enter marine waters.

Juveniles and subadults typically spend from 1 to 5 years foraging over thousands of miles in the North Pacific Ocean before returning to spawn. Some species, such as coho and chinook salmon, have precocious life history types (primarily male fish) that mature and spawn after only several months in the ocean. Spawning migrations known as “runs” occur throughout the year, varying by species and location. Most adult fish return or “home” with great fidelity to spawn in their natal stream, although some do stray to non-natal streams. Salmon species die after spawning, while steelhead may return to the ocean and make repeat spawning migrations.

This complex life cycle gives rise to complex habitat needs, particularly during the freshwater phase (Spence et al. 1996). Spawning gravels must be a certain size and free of sediment to allow successful incubation of the eggs. Eggs also require cool, clean, and well-oxygenated waters for proper development. Juveniles need abundant food sources, including insects, crustaceans, and other small fish. They need places to hide from predators (mostly birds and bigger fish), such as under logs, root wads, and boulders in the stream, as well as beneath overhanging vegetation. They also need places to seek refuge from periodic high flows (side channels and off-channel areas) and from warm summer water temperatures (coldwater springs and deep pools). Returning adults generally do not feed in fresh water but instead rely on limited energy stores to migrate, mature, and spawn. Like juveniles, they also require cool water and places to rest and hide from predators. During all life stages, salmon and steelhead require cool water that is free of contaminants. They also need migratory corridors with adequate passage conditions (timing, water quality, and water quantity) to allow access to the various habitats required to complete their life cycle.

The homing fidelity of salmon and steelhead is reflected in the distribution of distinct, locally adapted populations among watersheds with differing environmental conditions and distinct habitat characteristics (Taylor 1991, Policansky and Magnuson 1998, McElhany et al. 2000). Spatially structured populations in which populations or subpopulations occupy habitat patches, connected by some low-to-moderate stray rates, are often generically referred to as “metapopulations” (Levins 1969). Low-to-moderate levels of straying result in regular genetic exchange among populations, creating genetic similarities among populations in adjacent watersheds (Quinn 1993, Utter et al. 1989, Ford 1998).

The overall health and likelihood of persistence of salmon and steelhead metapopulations are affected by the abundance, productivity, connectivity/spatial structure, and diversity of the component populations (see McElhaney et al. 2000). With respect to the habitat requirements of a healthy ESU, an ESU composed of many diverse populations distributed across a variety of well-connected habitats can better respond to environmental perturbations including catastrophic events (Schlosser and Angermeier 1995, Hanski and Gilpin 1997, Tilman and Lehman 1997, Cooper and Manger 1999). Additionally, well-connected habitats of different types are essential to the persistence of diverse, locally adapted salmonid metapopulations capable of exploiting a wide array of environments, as well as capable of responding to and surviving both short- and long-term environmental change (e.g., Groot and Margolis 1991, Wood 1995). Differences in local flow regime, temperature regime, geological, and ecoregion characteristics correlate strongly with ESU population structure (Ruckelshaus et al. 2001).

ESUs with fewer and less diverse habitat types and associated populations are more likely to become extinct due to catastrophic events. They also have a lower likelihood that the necessary phenotypic and genotypic diversity will exist to maintain future viability. ESUs with limited geographic range are similarly at increased extinction risk due to environmental variability and catastrophic events. ESUs with populations that are geographically distant from each other, or that are separated by severely degraded habitat, may lack the connectivity to function as metapopulations and are more likely to become extinct. ESUs with reduced local adaptation and limited life-history diversity are more likely to go extinct as the result of correlated environmental catastrophes or environmental change that occurs too rapidly for an evolutionary response. Assessing the conservation value of specific habitat areas to ESU viability involves evaluating the quantity and quality of habitat features (for example, spawning gravels, wood and water condition, side channels), the relationship of the area to other areas within the ESU, and the significance to the ESU of the population occupying that area.

Geographical Area Occupied by the Species and Specific Areas within the Geographical Area

In past critical habitat designations, NOAA Fisheries concluded that the limited availability of species distribution data prevented mapping salmonid critical habitat at a scale finer than occupied river basins. While various efforts were underway to address these data limitations, the agency noted that “most have yet to be completed or fail to depict salmonid habitats in a consistent manner or at a fine geographic scale.” (65 FR 7764, February 16, 2000). Therefore, the 2000 designations indicated that the “geographical area occupied by the species” was best characterized by all accessible river reaches within the current range of the listed species.

For specific areas within that geographical area occupied by the species, NOAA Fisheries relied on the U.S. Geological Survey’s (USGS) identification of subbasins, which was the finest scale mapped by USGS at that time. The subbasin boundaries are based on an area’s topography and hydrography, and USGS has developed a uniform framework for mapping and cataloging drainage basins using a unique hydrologic unit code (HUC) identifier (Seaber et al. 1986). The HUCs contain separate two-digit identifier fields wherein HUC1 refers to a region comprising a relatively large drainage area (e.g., Region 17 for the entire Pacific Northwest), while subsequent fields identify smaller nested drainages. Under this convention, subbasins are commonly referred to as HUC4s. In its 2000 designations, then, NOAA Fisheries identified as critical habitat all areas accessible to listed salmon within an occupied HUC4.

Since the previous designations in 2000, two key efforts have significantly improved NOAA Fisheries’ ability to identify freshwater and estuarine areas occupied by salmonids and to group the occupied stream reaches into finer scale “specific areas.”

The first key effort has allowed NOAA Fisheries to be more precise about the “geographical area occupied by the species.” Federal, state, and tribal fishery biologists have made progress mapping species distribution at the level of stream reaches. The mapping includes areas where the species has been observed or where it is presumed to occur based on the professional judgment of biologists familiar with the watershed. Much of these data can now be accessed and analyzed using geographic information systems (GIS) to produce consistent and fine-scale maps. As a result, nearly all salmonid freshwater and estuarine habitats in Washington, Oregon, and Idaho are now mapped and available in GIS at a scale of 1:24,000 (see references in Appendices). Previous distribution data were often compiled at a much coarser scale of 1:100,000 or greater. NOAA Fisheries made use of these finer-scale data for the current critical habitat designations and now believes that they enable a more accurate delineation of "geographical area occupied by the species" referred to in the ESA definition of critical habitat.

The second key effort has allowed NOAA Fisheries to identify "specific areas" (section 3(5)(a)) and "particular areas" (section 4(b)(2)) at a much finer scale. Since 2000, various federal agencies have identified HUC5 watersheds throughout the Pacific Northwest using the USGS mapping conventions referred to above. This information is now generally available from these agencies and via the internet (California Spatial Information Library 2004, Interior Columbia Basin Ecosystem Management Project 2003, Regional Ecosystem Office 2004). NOAA Fisheries used this information to organize critical habitat information systematically and at a scale that was relevant to the spatial distribution of salmon and steelhead. Organizing information at this scale is especially relevant to salmonids, since their innate homing ability allows them to return to particular reaches in the specific watersheds where they were born. Such site fidelity results in spatial aggregations of salmonid populations (and their constituent spawning stocks) that generally correspond to the area encompassed by HUC4s or HUC5s (Washington Department of Fisheries et al. 1992, Kostow 1995, McElhany et al. 2000).

In addition, HUC5 watersheds are consistent with the scale of recovery efforts for West Coast salmon and steelhead. In its review of the long-term sustainability of Pacific Northwest salmonids, the National Research Council's (NRC) Committee on Protection and Management of Pacific Northwest Anadromous Salmonids concluded that "habitat protection must be coordinated at landscape scales appropriate to salmon life histories" and that social structures and institutions "must be able to operate at the scale of watersheds" (NRC 1996).

Watershed-level analyses are now common throughout the West Coast (Forest Ecosystem Management Assessment Team 1993, Montgomery et al. 1995, Spence et al. 1996). There are presently more than 400 watershed councils or groups in Washington, Oregon, and California alone (For the Sake of the Salmon 2004). Many of these groups operate at a geographic scale of one to several HUC5 watersheds and are integral parts of larger-scale salmon recovery strategies (Northwest Power Planning Council 1999, Oregon Plan for Salmon and Watersheds 2001, Puget Sound Shared Strategy 2002, CALFED Bay-Delta Program 2003). Concurrent with these efforts, NMFS has developed various ESA guidance documents that underscore the link between salmon conservation and the recovery of watershed processes (NMFS 1996 and 1999) Aggregating stream reaches into HUC5 watersheds allowed the agency to refine its interpretation of the "specific areas" within or outside the geographical area occupied by the species, at a scale that corresponds well to salmonid population structure and ecological processes.

Occupied estuarine and marine areas were also considered. In previous designations of salmonid critical habitat we did not designate marine areas outside of estuaries and Puget Sound. In the Pacific Ocean, we concluded that there may be essential habitat features, but they did not require special management considerations or protection. Since that time we have carefully considered the statutory and regulatory direction, the best available scientific information, and related agency actions, such as the designation of Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act.

We now conclude that it is possible to delineate specific estuarine areas in Puget Sound, the Columbia River, and along the Oregon Coast as well as specific nearshore areas of Puget Sound that are occupied and contain essential habitat features and may require special management considerations or protection. Estuarine areas are crucial for juvenile salmonids given their multiple functions as areas for rearing/feeding, freshwater-saltwater acclimation, and migration (Simenstad et al. 1982, Marriott et al. 2002). In many areas, especially the Columbia River estuary, these habitats are occupied by multiple populations and ESUs. We are proposing to designate occupied estuarine areas in similar terms to our past designations, as being defined by a line connecting the furthest land points at the estuary mouth.

Nearshore areas also provide important habitat for rearing/feeding and migrating salmonids, and in Puget Sound support multiple populations of Puget Sound Chinook and Hood Canal summer-run chum salmon (Beamish et al. 1998, Washington Department of Fish and Wildlife [WDFW] and Point No Point Treaty Tribes [PNPTT] 2000). As noted in previous rulemaking (65 FR 7764, February 16, 2000), the unique ecological setting of Puget Sound allowed us to focus on defining specific occupied marine areas. As with the freshwater areas described above, we identified 19 nearshore marine zones in Puget Sound based on water resource inventory areas defined by the state of Washington (NMFS 2004a, Washington Department of Ecology 2004). These nearshore zones in Puget Sound were focused on areas contiguous with the shoreline out to a depth no greater than 30 meters relative to mean lower low water. This nearshore area generally coincides with the maximum depth of the photic zone in Puget Sound and contains physical or biological features essential to the conservation of salmonids (Mazer and Shepard 1962, Bakkala 1970, Mathews and Senn 1975, Fraser et al. 1978, Peterman 1978, Sakuramoto and Yamada 1980, Martin et al. 1986, Healey 1982, Bax 1983, Salo 1991 as cited in Johnson et al. 1997, WDFW and PNPTT 2000, Puget Sound Nearshore Ecosystem Restoration Program 2003, Williams et al. 2003).

We did not identify offshore marine areas of Puget Sound and the Pacific Ocean For salmonids in offshore marine areas beyond the nearshore extent of the photic zone, it becomes more difficult to identify specific areas where essential habitat features can be found. Links between human activity, habitat conditions and impacts to listed salmonids are less direct in offshore marine areas. Perhaps the closest linkage exists for salmon prey species that are harvested commercially (e.g., Pacific herring) and therefore may require special management considerations or protection. However, because salmonids are opportunistic feeders we could not identify "specific areas" beyond the nearshore marine zone where these or other essential features are found within this vast geographic area occupied by Pacific salmon. Moreover, prey species move or drift great distances throughout the ocean and would be difficult to link to any "specific" areas.

Unoccupied Areas

ESA Section 3(5)(A)(ii) defines critical habitat to include "specific areas outside the geographical area occupied" if the areas are "essential for the conservation of the species." NOAA Fisheries regulations at 50 CFR 424.12(e) emphasize that the agency "shall designate as critical habitat areas outside the geographical area presently occupied by a species only when a designation limited to its present range would be inadequate to ensure the conservation of the species." The agency focused its attention on the species' historical range when considering unoccupied areas since these logically would have been adequate to support the evolution and long-term maintenance of evolutionarily significant units. As with occupied areas, the agency considered the stream segments within a HUC5 to best describe specific areas. While it is possible to identify which HUC5s represent geographical areas that were historically occupied with a high degree of certainty, this is not the case with specific stream segments. This is due, in part, to the emphasis on mapping currently occupied habitats and to the paucity of site-specific or systematic historical stream surveys. As described later in this document, the CHARTs did identify unoccupied HUC5s and stream reaches that may be essential for conservation for some ESUs.

"Physical or Biological Features Essential to the Conservation of the Species" (Primary Constituent Elements)

Agency regulations at 50 C.F.R. 424.12(b) interpret the statutory phrase "physical or biological features essential to the conservation of the species." The regulations state that these features include, but are not limited to, space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, and rearing of offspring; and habitats that are protected from disturbance or are representative of the historical geographical and ecological distribution of a species. The regulations further direct us to "focus on the principal biological or physical constituent elements . . . that are essential to the conservation of the species, and specify that these elements shall be the "known primary constituent elements." The regulations identify primary constituent elements (PCE) as including, but not being limited to: "roost sites, nesting grounds, spawning sites, feeding sites, seasonal wetland or dryland, water quality or quantity, host species or plant pollinator, geological formation, vegetation type, tide, and specific soil types."

NMFS biologists developed a list of PCEs specific to salmon and relevant to determining whether occupied stream reaches within a watershed consistent with the ESA section (3)(5)(A) definition of "critical habitat" and the implementing regulation at 50 CFR 424.12(b). Relying on the biology and life history of each species, we determined the physical or biological habitat features essential for their conservation. We identified these features in the ANPR (68 FR 55926, September 29, 2003) and received very few comments specifically addressing PCEs. Since the publication of the ANPR and as a result of the CHART assessments, we have developed a revised set of the PCEs described in the ANPR.

The ESUs addressed in this rulemaking share many of the same rivers and estuaries and have similar life history characteristics and, therefore, many of the same PCEs. These PCEs include sites essential to support one or more life stages of the ESU (sites for spawning, rearing, migration and foraging). These sites in turn contain physical or biological features essential to the conservation of the ESU (for example, spawning gravels, water quality and quantity, side channels, forage species). Specific types of sites and the features associated with them include the following:

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;

2. Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks;

3. Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival;

4. Estuarine areas free of obstruction and excessive predation with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and

overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

5. Nearshore marine areas free of obstruction and excessive predation with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.

6. Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

Special Management Considerations or Protection

NOAA Fisheries ESA regulations at 424.10(j) define "special management considerations or protection" to mean "any methods or procedures useful in protecting physical and biological features of the environment for the conservation of listed species." Based on discussions with NOAA Fisheries biologists in the Habitat Conservation Division (HCD) and the report by Spence et al. (1996), NOAA Fisheries identified a number of management activities that may affect the PCEs. The Spence et al. (1996) report contains a comprehensive review of factors limiting salmonid growth and production and relates them to specific human activities and useful management practices/actions. Major categories of habitat-related activities, identified in this report and through discussions with HCD biologists, include (1) forestry (2) grazing, (3) agriculture, (4) road building/maintenance, (5) channel modifications/diking, (6) urbanization, (7) sand and gravel mining, (8) mineral mining, (9) dams, (10) irrigation impoundments and withdrawals, (11) river, estuary, and ocean traffic, (12) wetland loss/removal, (13) beaver removal, and (14) exotic/invasive species introductions. In addition to these, the harvest of salmonid prey species (e.g., herring, anchovy, and sardines) may present another potential habitat-related management activity (PFMC 1999). All of these activities have PCE-related impacts via their alteration of one or more of the following: stream hydrology, flow and water-level modifications, fish passage, geomorphology and sediment transport, temperature, dissolved oxygen, vegetation, soils, nutrients and chemicals, physical habitat structure, and stream/estuarine/marine biota and forage (Spence et al. 1996; PFMC 1999).

CRITICAL HABITAT ANALYTICAL REVIEW TEAMS

OVERVIEW

To assist in the designation of critical habitat, the agency convened several CHARTs. The CHARTs consisted of federal salmonid biologists and habitat specialists tasked with assessing biological information pertaining to areas under consideration for designation. The CHARTs explored a variety of data sources and used their best professional judgment to (1) verify the presence of PCEs within each occupied HUC5, (2) verify the existence of management activities that may affect the PCEs, and (3) rate the conservation value of watersheds, riverine corridors, and estuarine areas occupied and/or essential to conserving particular ESUs.

In the NOAA Fisheries NWR, the agency created CHARTS organized by major geographic domains that roughly correspond to recovery planning domains. Each CHART had a team leader from the NOAA Fisheries HCD and several federal employees with demonstrated expertise regarding salmonid habitat within the domain. Most CHART members came from various NOAA Fisheries divisions and programs (i.e., the HCD, Salmon Recovery Division, Hydropower program), while some teams included experts from the U.S. Forest Service, U.S. Bureau of Land Management, U.S. Fish and Wildlife Service, and National Park Service. To date, more than 65 federal biologists have participated on these CHARTs. Some CHARTs also benefited from expertise provided by state fisheries biologists working for NOAA Fisheries under Interagency Personnel Agreements or from Tribal biologists familiar with particular ESUs or areas. These experts were not, however, considered part of the CHART membership for the purposes of deliberation, scoring and rating watersheds and areas.

The CHARTS have completed three phases of work associated with critical habitat designations. In the first phase, each CHART met to discuss the assignment and to identify the best scientific information available regarding the habitats supporting the ESUs in their domain. This phase also involved developing a CHART scoring system for systematic discussion and evaluation of PCEs and for contributing to the determination of the overall conservation value of particular watersheds and areas[3]. After collecting and synthesizing the available data for an ESU, the CHARTs met during Phase 2 to review

[3] The Oregon Coast CHART employed a computerized "Decision Support System" DSS to assist their assessment rather than the scoring system used by the other CHARTs. The Oregon Coast CHART relied on similar types of data as the other CHARTs, however, data regarding habitat and species abundance and distribution for Oregon Coast coho salmon are generally more comprehensive and accessible for computer analyses than for other ESUs.

and discuss the information. In this phase the CHARTs verified the presence of the PCEs in each occupied HUC5, identified management activities that may affect those PCEs, and collectively scored each occupied watershed/area using the system developed in the first phase. In Phase 3, the CHARTs reviewed the scores derived in Phase 2 and then considered additional information about the relationship of each HUC5 to other HUC5s in the ESU and information about the population occupying each HUC5 and that population's relationship to other populations in the ESU. Based on the scores and the additional considerations, the CHARTs assigned conservation value ratings of high, medium, or low to each watershed. Details and key considerations involved in each phase are discussed below.

CHART PHASE 1

In Phase 1, CHARTs convened for a one-day orientation to the statutory and regulatory aspects of ESA critical habitat and discussed ways to identify the best available scientific data relevant to assessing critical habitat for each ESU. CHART biologists also helped develop and test a multi-factor scoring system that provided a consistent framework within which the CHARTs could process information that would ultimately inform its conservation value rating of each watershed or area. The basis for using this factor-based scoring system was twofold. First it allowed CHART members with varied levels of experience in a particular geographic area to share and discuss their knowledge of specific places and biological/physical features using a consistent set of relevant factors for each watershed in the range of an ESU. Second it generated quantitative results (i.e., sums of factor scores) that displayed numerical variation between watersheds/areas that greatly facilitated the ultimate CHART rating of each watershed/area's conservation value. Third, it provided a uniform and systematic way to assess the overall conservation value of component watersheds and areas for each ESU under agency consideration. The scoring system used by the CHARTs is shown in Table 1.

CHART PHASE 2

In Phase 2, each CHART met to discuss the information identified in Phase 1 and to (1) verify the presence of PCEs in each HUC5, (2) identify management actions that may affect the PCEs, and (3) apply the scoring system. This phase required approximately 1 to 7 days to complete, depending on the size of the ESU under consideration and the number of watersheds assessed. For each watershed, the CHART members assessed the best available fish distribution data and noted any discrepancies with their own knowledge of the area (which included documented sources of information). If discrepancies were found, they were flagged for follow-up and resolution with the appropriate state fishery agency. The CHARTs then confirmed whether the occupied reaches/areas were likely to contain one or more of the specified PCEs. To aid in these assessments, the teams were provided with GIS data and maps displaying a variety of data layers including fish and PCE distributions, ESU population boundaries, stream hydrography, land use, land cover, and land ownership. The CHARTs were also asked to determine whether the PCEs in a particular HUC5 could be affected by human actions and whether such actions are actually occurring in that HUC5 (based on their experience in ESA section 7 consultations).

CHART PHASE 3

In Phase 3, the CHARTs met to discuss the watershed scores generated in Phase 2, along with additional considerations, to assign a high, medium, or low conservation value[4] to each watershed/area (the conservation value of a given HUC5 is the relative importance of the HUC5 to conservation of the ESU). The additional considerations included the relationship of each HUC5 to other HUC5s in the ESU and the significance to the ESU of the population occupying each HUC5. As an example of the first additional consideration, a HUC5 with a particular raw score might receive a medium rating if it is in close proximity to several other high-scoring HUC5s that support the ESU, while another HUC5 with that same raw score might receive a high rating if it is one of only a few HUC5s supporting an ESU, or if the other HUC5s have low scores. As another example of the first consideration, connectivity of habitats is an important consideration for anadromous salmonids, which require access to the ocean as well as to a network of connected spawning habitats. Thus a HUC5 that contains a rearing and migration corridor for fish from a high-valued spawning area might receive a high rating even though it has a medium score.[5]

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[4] In the Advance Notice of Proposed Rulemaking (68 FR 55926, September 29, 2003) we describe the conservation value of a site as depending on "(1) the importance of the populations associated with a site to the ESU conservation, and (2) the contribution of that site to the conservation of the population either through demonstrated or potential productivity of the area."

[5] The CHARTs discussed this concept at length and were unanimous in concluding that this was a logical assertion to make for anadromous salmon and steelhead. Moreover, it helped resolve a recurring issue for some ESUs with HUC5s having relatively low or limited value tributary spawning habitats but which had primary importance as a rearing/migration corridor for fish/habitats upstream. In this case, the HUC5 could be assigned a lower overall conservation value, but could still contain a rearing/migration corridor with a higher conservation value.

Table 1. Factors and Associated Criteria Considered by several CHARTs to Determine the Conservation Value of Occupied HUC5s

Factors	**Criteria**
Factor 1. PCE Quantity Considers the total stream area or number of reaches in the HUC5 where PCEs are found and compares them relative to other HUC5s and their probable historical quantity in the HUC5.	3 = High number of stream reaches with PCEs in the HUC5. 2 = Moderate number of stream reaches with PCEs in the HUC5, near or reduced from historic levels. 1 = Low number of stream reaches with PCEs are in the HUC5, likely reduced from historic potential. 0 = Low number of stream reaches with PCEs are in the HUC5, likely near historic potential.
Factor 2. PCE Quality – Current Condition Considers the existing condition of the quality of PCEs in the HUC5.	3 = PCEs in the HUC5 are in good to excellent condition. 2 = PCEs in the HUC5 are in fair to good condition. 1 = PCEs in the HUC5 are in fair to poor condition. 0 = PCEs in the HUC5 are in poor condition.
Factor 3. PCE Quality – Potential Condition Considers the likelihood of achieving PCE potential in the HUC5, either naturally or through active conservation/restoration, given known limiting factors, likely biophysical responses, and feasibility.	3 = PCEs in the HUC5 are highly functioning and are at their historic potential. 2 = PCEs in the HUC5 are reduced, but have high improvement potential. 1 = PCEs in the HUC5 may have some improvement potential. 0 = PCEs in the HUC5 have little or no improvement potential.
Factor 4. PCE Quality – Support of Rarity/Importance Considers the PCE support of rare genetic or life history characteristics or rare/important habitat types in the HUC5	3 = Highly likely that PCEs in the HUC5 support a rare genetic or life history type or include a rare/important habitat type (e.g., seeps, coldwater refuges, side channels, lakes). 2 = Possible that PCEs in the HUC5 support a rare genetic or life history type or include a rare/important habitat type. 1 = Unknown whether PCEs in the HUC5 support a rare genetic or life history type or include a rare/important habitat type. 0 = Unlikely that PCEs in the HUC5 probablysupport a rare genetic or life history type or include a rare/important type.
Factor 5. PCE Quality – Support of Abundant Populations Considers the PCE support of variable-sized populations relative to other HUC5s and the probable historical levels in the HUC5	3 = PCEs in the HUC5 currently support a large population. 2 = PCEs in the HUC5 historically supported a large population that is currently small. 1 = PCEs in the HUC5 currently and/or historically supported a small population. 0 = PCEs in the HUC5 support a population whose abundance is unknown or it is unlikely that it is or was significant.
Factor 6. PCE Quality – Support of Spawning/Rearing Considers the PCE support of spawning or rearing of varying numbers of populations.	3 = PCEs in the HUC5 support (currently or historically) spawning or rearing of multiple populations or life history types, or support the only extant spawning habitat for a single population. 2 = PCEs in the HUC5 related to spawning or rearing are found in two or more HUC5s that support a single population. 1 = Uncertain but possible that the PCEs in the HUC5 support spawning or rearing for at least one population. 0 = Unlikely that there are PCEs in the HUC5 that support spawning/rearing for at least one population.

The second consideration involves population characteristics and is relevant because some populations have a higher conservation value to the ESU than others. Thus a HUC5 that received a medium score might nevertheless be rated high if it supports a unique or significant population within the ESU. In other words, the scores provided a judgment about the value of each HUC5 in isolation, while the additional considerations allowed the CHARTs to evaluate the relative contribution of each HUC5 and come up with an overall rating.

Based on the raw scores and the additional considerations, high-value watersheds/areas were those deemed to have a high likelihood of promoting ESU conservation, while low-value watersheds/areas were expected to contribute to conservation in only a minor way. The watershed scoring system proved to be a useful tool for informing the rating of conservation value; in general, those watersheds and areas that received the highest scores in Phase 2 also were deemed to have a high conservation value for the ESU, while the opposite was true for low-scoring watersheds and areas.

The final step in Phase 3 involved asking the CHARTs to identify any unoccupied areas that may be essential for the conservation of an ESU. Section 3(5)(C) of the ESA allows the agency to designate unoccupied areas, but only upon making a finding that "such areas are essential for the conservation of the species." Regulations at 50 CFR 424.12(e) state that the agency "shall designate as critical habitat areas outside the geographical area presently occupied by a species only when a designation limited to its present range would be inadequate to ensure the conservation of the species." The CHARTs were asked to provide their professional judgment as to whether limiting the designation to the entire occupied range would be adequate to ensure the conservation of the ESU. It was not possible for the CHARTs to determine conclusively that particular unoccupied areas "are" essential for the conservation of an ESU because such a determination would require a more comprehensive assessment than was possible at this point in the recovery planning process. The CHARTs were, however, able to identify those areas that may be essential for conservation. In making this assessment, the CHARTs used information regarding the ESU's historic distribution, as well as pertinent information from Section 7 consultations and developing recovery plans. The types of HUC5s considered included those that are entirely blocked (e.g., areas above impassable dams). They also included HUC5 areas with some occupied stream reaches, as well as other reaches that were historically occupied, but that have been rendered inaccessible due to manmade obstructions.

NEXT STEPS

The preliminary CHART assessments were submitted for comanager review and comment. Comments were received from several tribes, as well as the Oregon Department of Fish and Wildlife, and Washington Department of Fish and Wildlife. Comments were also received from the Idaho Department of Fish and Game, however these did not arrive in time to include in the final CHART assessments. CHART members considered the available comments and made revisions as they deemed appropriate for ESU. The resulting initial CHART assessments will inform the agency's designation of critical habitat, in particular the relative benefits of including particular areas as critical habitat. This and other related reports will be distributed for peer review during the agency's formal rulemaking process. The CHARTs will be reconvened to review the comments and any new information that might bear on their initial assessments before the agency publishes final critical habitat designations.

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